Spring 2013

The Department of Electrical and Computer Engineering

UNIVERSITY of DAYTON

CALENDAR OF EVENTS

Summer Honors Engineering Camp
June 17-22, 2013

Women in Engineering Summer Camp
July 7-12, 2013

Summer Graduation
August 5, 2013

Fall Classes Begin
August 21, 2013

THE DEPARTMENT OF
ELECTRICAL AND COMPUTER ENGINEERING

SPRING 2013 VOLUME 1, ISSUE 1

CHAIR'S CORNER

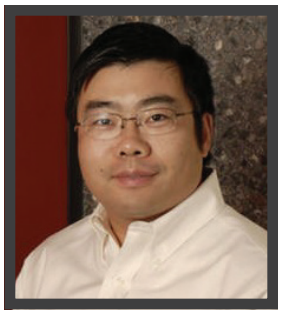
It's time to reflect on another exciting year in the ECE department. The year began with the good news that Professor Michael Wicks was awarded the 2013 IEEE Dennis J. Picard Medal for Radar Technologies and Applications. Professor Wicks is planning and building a new Center of Excellence for Distributed Sensing, a research lab that will have a large electromagnetic chamber with spatial and spectral diversity. I am delighted that Agilent Technologies is interested in partnering with us and has committed to donating key equipment for this new center.

Another major development is the approval for our new Center of Excellence for Thin-film Research and Surface Engineering (CETRASE), which was inaugurated April 12, 2013. The new center is a collaboration of several ECE faculty professors, including Dr. Banerjee, Dr. Guliants, Dr. Haus, Dr. Sarangan, Dr. Subramanyam and Dr. Zhan. Professors from other disciplines include: Professor Murray from UDRI, Professor Powers from the physics department, Professor Fried from chemical and materials engineering and Professor Hansen from biology. The goal of the center is to enhance collaborative research in the application areas of electronics, communication, sensors and devices, optoelectronics, optical coatings, MEMS, MOMS, energy storage and others. It brings together successful individual research efforts to this new collaborative center. The CETRASE will offer an integrated, coherent, academic program in thin film science and engineering containing a significant laboratory component. Nine independent research laboratories will join forces under the development of CETRASE.

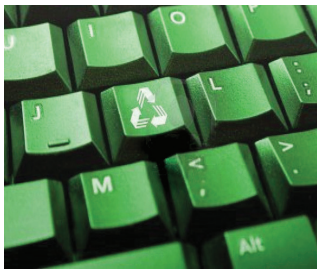
Thanks to our ECE friends and family, we have also successfully raised enough funds for the IEEE Krishna M. Pasala, Ph.D. Memorial Scholarship fund. The IEEE Dayton section recognized our first recipient of the scholarship award, Mr. Zhenyu Yang, a Ph.D. student in our department, on April 27, 2013. Our sincere thanks to Dr. John Malas, the Pasala family, and our colleagues and friends who contributed to this scholarship fund through the IEEE foundation. In addition, the Professor Charles Gauder, Sr. Scholarship has been established in the memory of Professor Charles Gauder, Sr. The special scholarship funds will be awarded to a student who loves soccer, remembering Chuck's passion for soccer. Also, a new endowment fund is being established in the name of Professor Kubak, who passed away last year. We are thankful for our alumni who continue to support our department in many ways, including financially. We welcome each one of you to come and experience the electrical and computer engineering department. We are looking forward to sharing the new Centennial Book with our alumni in the next few months!

PROFESSOR QIWEN ZHAN CHOSEN AS FELLOW OF SPIE

Professor Qiwen Zhan from the electro-optics program was chosen as a fellow of SPIE for his achievements in space variant polarization engineering. SPIE is the international society for optics and photonics and honored 69 new fellows of the society this year. Fellows are members of distinction who have made significant scientific and technical contributions in the multidisciplinary fields of optics, photonics and imaging. They are honored for their technical achievement, their service to the general optics community and to SPIE in particular. Zhan's research interests include plasmonics, nanophotonics, physical optics, metamaterials, polarization optics and metrology. Zhan received his fellow award at the SPIE Photonics West Conference in San Francisco in February.



UD COLLABORATES WITH MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY TO ORGANIZE ICGT 2012



The 2012 International Conference on Green Technologies (ICGT12) was jointly organized by Mar Baselios College of Engineering and Technology and the University of Dayton. Together, they held a conference in Kerala, India, December 18-20, 2012.

Rapid industrialization and technological progress has led to unprecedented growth and developments across the globe. However, the adverse effects of this growth have degraded the earth's natural resources in combination with greenhouse gases and has caused irreparable damage to the environment.

New technological advances have been made in the field of green energy, which encompasses the reduction of carbon emissions, reversal of ecological destruction, and ending what a UN report calls "the unrestrained drawdown of the Earth's non-renewable resources."

ICGT12 provided a forum for presenting and discussing innovative energy-conserving designs, new and alternative technologies, architecture, and protocols and management on a broad range of engineering disciplines. The conference included technical programs, workshops and tutorials. The ECE department's very own Dr. Subramanyam and Dr. Asari served on the advisory committee for the conference.

UNIVERSITY of DAYTON
Center of Excellence for Thin-Film Research and Surface Engineering

UD RESEARCHERS COLLABORATE TO OPEN A NEW MATERIALS RESEARCH CENTER

Ten University of Dayton researchers with a combined 15 patents and more than 600 contributions to publications have joined forces to establish a new Center of Excellence for Thin-film Research and Surface Engineering (CETRASE).

"Our research will focus on key engineering challenges utilizing advanced thin films and surface engineering," said Dr. Guru Subramanyam, representing the CETRASE. "We want to find ways to make better, more efficient, cost-effective sensors, electronics, electro-optics, and energy systems and hopefully create new jobs in the region."

The new center will be spread among labs in Kettering Laboratories, College Park Center and the Science Center. The researchers are from the departments of electrical and computer engineering, materials engineering, biology, physics, the electro-optics graduate program and the University of Dayton Research Institute. Two are fellows of SPIE, the international society for optics and photonics. Comprehensive thin film fabrication equipment and characterization equipment are available in the center, along with multiple patented technologies developed by the researchers of CETRASE.

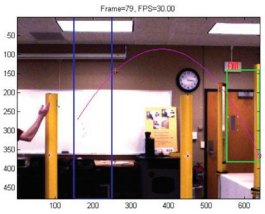
The researchers have collaborated on similar projects before, and according to Subramanyam, "It makes sense for us to put our heads together for a center where we can coordinate activities, interact periodically and share common equipment and costs."

THANI CHETTIYAR RECIEVES MEDAL FROM THE PRESIDENT OF INDIA

Thanigasalam Chettiyar received the prestigious gold medal from the president of India for securing the top rank at SRM (Sri Ramaswamy Memorial) University during his undergraduate education. He describes this memorable event as "a wonderful experience — one that I will cherish for the rest of my life."

His family and friends were able to watch him receive the award via a live telecast on the university website. He feels privileged to have received the medal from the president and explains that kind of recognition as both humbling and motivational. Chettiyar extends his deepest gratitude to his family, teachers and friends for their constant support and encouragement, as none of this would have been possible without them.

Chettiyar spent his senior year at the University of Dayton in the department of electrical and computer engineering in a transfer program. Solving real-world problems in the form of projects and interactions with fellow students and faculty has proved beneficial to Chettiyar and will continue to be instrumental in his overall professional development. Currently, he is pursuing a master's degree in electrical engineering at UD and intends to work in helping solve power and energy problems around the world.



ECE 445 STUDENTS CREATE A VARIETY OF PROJECTS

In Dr. Hardie's ECE 445 Signal Processing class, the students worked on open-ended design projects with the assistance of Tem Messay. These included a vision-based toaster control system, 3-D sound generation and a robotic ball catcher.

The goal of the vision-based toaster control system was to develop a novel toaster that toasts bread perfectly. The majority of toasters measure toast based on time, but often the time it takes to toast a slice of bread can vary. By making use of visual sensory information (e.g., color or state of bread) and an elaborate control system scheme, it was possible to adjust the heat proportionally and smartly toast bread to that perfect shade of golden brown.

The 3-D sound generation involved simulating directional sound using a mono source for listening in headphones. By processing the mono signal using two different filters, one for the left ear and one for the right, students were able to create the perception of 3-D directional sound.

The robotic ball catcher used a real-time computer vision system to track a thrown ball, predict the trajectory and position a catching basket using the Motoman HP3 to catch the ball. The communication protocol employed to govern the robot was found to be inadequate for ball-catching purposes. There was a considerable delay between a command and the resultant motion of the robot. However, by predicting the trajectory of the ball using vision, the students were able to compensate for the existing delay and succeed in the project to which they were assigned.

DR. WICKS SELECTED FOR 2013 IEEE MEDAL OF HONOR

The IEEE board of directors selected Dr. Michael Wicks to receive the 2013 IEEE Dennis J. Picard Medal for Radar Technologies and Applications, which is given for outstanding accomplishments in advancing the fields of radar technologies and their applications. The award comes with the following citation: "For leadership in fully adaptive radar, advanced space-time adaptive processing (STAP), knowledge-based signal processing, and waveform diversity."

For nearly a century, the IEEE awards program has paid tribute to researchers, inventors, innovators and practitioners whose exceptional achievements and outstanding contributions have made a lasting impact on technology, society and the engineering profession. Wicks is planning and building a new Center of Excellence for Distributed Sensing, a research lab that will have a large electromagnetic chamber with spatial and spectral diversity.

UD TECH OUTREACH

UD TECH OUTREACH HOOKS UP LOCAL ELEMENTARY SCHOOL

On March 14, UD Tech Outreach completed their first service project. The service organization's primary purpose is to provide technical and computer support for non-profit organizations around Dayton. For their first project, the students involved in UDTO worked with Bishop Leibold School, a Catholic elementary school, to set up a wireless network.

After collaboration with the school's technology coordinator, wireless routers and the other wireless access points were tested at the school using equipment donated by the electrical and computer engineering department. The range and speed of each device was tested in order to determine how many devices the school should buy and also where to place them. After the tests were performed, UD Tech Outreach decided to install seven Aruba Instant 105 wireless access points along with a HP ProCurve 2915-8G-PoE Switch.

The first day consisted of installing the HP switch and configuring the access points so that the rest of the week could be focused on hooking up the equipment. Over the course of the next three days, all of the access points were installed. The connectivity of the network was tested to ensure that all parts of the building had a strong signal and that a mobile device could easily roam from one access point to another.

Bishop Leibold faculty members began using their new wireless network immediately and are thoroughly enjoying its benefits.

AWARDS/ HONORS/PROMOTIONS

- Dr. Guru Subramanyam has been selected as an IEEE program evaluator in electrical engineering for the ABET Engineering Accreditation Commission.
- Dr. Andrew Sarangan has been chosen as one of the 2013 Affiliate Societies Council Outstanding Engineers and Scientists awards winners. He is being recognized in the category of research.
- Dr. Raúl Ordóñez has been promoted to full professor beginning in the fall 2013 semester.

STUDENT AWARDS

- Erin Patterson, sophomore, was given the Best Presentation Award for her presentation at the eighth annual Dayton Engineering Sciences Symposium.
- The Thomas R. Armstrong, '38, Award of Excellence for Outstanding Electrical/Computer Engineering Achievement was awarded to Mark Connor.
- The Brother Louis H. Rose, S.M., '33, Award of Excellence to the Outstanding Junior in Electrical/ Computer Engineering was awarded to Matthew Fakler and Carly Gross.
- The Anthony Horvath, '22, and Elmer Steger, '22, Award of Excellence to the Outstanding Senior in Electrical/Computer Engineering was given to Brendan Rice and Evan Krieger.
- The Mary C. Millette Endowment Award for the Outstanding Senior Electrical and Computer Engineering Student was given to Sarah Struckman.

ECE GRADUATES: MAY 2013

DOCTORAL DEGREES AWARDED

Osama Abolaeha

MASTER'S DEGREES AWARDED

Muhammed Adil
Nihad Al-Faisali
Abdullah Alrushud
Nikitha Appana
Karthika Baskar
Yakov Diskin
Shichao Guo
Jin He
Kevin Jackovitz
Mohammed Khan
Zhengqing Mao
Pagalavan Mathari Bakthavatsalam
Prem Mohandoss
Barath Narayanan
Xinwei Shen
Huanxin Wang
Xun Wang
Xiaozhou Zhang
Zhiqi Zhu

BACHELOR'S DEGREES AWARDED

Colbey Basinger
Brian Bernard
Mark Connor
Kristen Diddle
Nick Fahrig
Yuan Feng
William Freshwater
Jonathan Headlee
Brian Herdeman
Jarred Huey
Evan Krieger
Brian Kroeger
Muyuan Li
James Lilie
Andrew Maximo
John McHugh
Sean Moore
Wenjia Ouyang
Eric Platek
Howard Poston
Brendan Rice
Dante Richardson
Matthew Schwertner
Michael Smetana
Daniel Sullivan
Hai Tang
Adam Von Lehmden
Jianwei Wang
Matthew Weinberger

2012 FACULTY PUBLICATIONS/CONFERENCES/JOURNALS/PATENTS

Menatoallah Youssef and **Vijayan K. Asari**, "Human action recognition using hull convexity defect features with multi-modality setups," ***Pattern Recognition Letters:*** *Special Issue on Smart Approaches for Human Action Recognition*, February 2013.

M. Nazrul Islam, Mohammad A. Karim, and **Vijayan K. Asar**i, "Information security using multiple reference-based optical joint transform correlation and orthogonal code," ***Journal of Optics & Laser Technology***, March 2013.

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Jacob Foytik and **Vijayan K. Asari**, "A two-layer framework for piecewise linear manifold-based head pose estimation," ***International Journal of Computer Vision***, pp. 1-18, September 2012.

Ming-Jung Seow, Ann Theja Alex, and **Vijayan K. Asari**, "Learning embedded lines of attraction by self organization for pose and expression invariant face recognition," ***SPIE Journal of Optical Engineering***, vol. 51, no. 10, pp. 107-201: 1-8, October 2012.

Alex Mathew and **Vijayan K. Asari**, "Local histogram based descriptor for object tracking in wide area motion imagery," ***International Journal of Information Processing***, vol. 6, no. 4, pp. 1-12, 2012.

Theus Aspiras and **Vijayan K. Asari**, "Regressive and blind source separation techniques for ocular artifact removal," ***International Journal of Information Processing***, vol. 6, no. 3, pp. 42-54, 2012.

Theus Aspiras and **Vijayan K. Asari**, "Recognition of emotional states using nonlinear range compression of EEG spectral data," ***International Journal of Information Processing***, vol. 6, no. 2, pp. 60-72, 2012.

Hiroki Higa and **Vijayan K. Asari**, "Development of a video-based user interface for people with severe disabilities," ***International Journal of Information Technology and Network Application***, vol. 2, no. 2, pp. 23-30, April 2012.

Numan Unaldi, Samil Temel, and **Vijayan K. Asari**, "Optimal sensor deployment method on 3D terrains utilizing a steady state genetic algorithm with a guided walk mutation operator based on wavelet transform," ***Sensors:*** *An International Journal*, vol. 12, no. 4, pp. 5116-5133, April 2012.

Syed Mahfuzul Aziz, **Vijayan K. Asari**, Alamgir Hossain, Mohammad Ataul Karim, Mariofanna Milanova, "Guest Editorial," ***Journal of Computers***, vol 7, no 3, pp. 563-566, March 2012.

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Kongfeng Zhu, **Vijayan K. Asari**, and Dietmar Saupe, "No-reference quality assessment of H.264/AVC encoded video based on natural scene features," ***SPIE Conference on Defense, Security, and Sensing: Mobile Multimedia/Image Processing, Security, and Applications 2013***, Baltimore, MD, USA, 29 April - 03 May 2013.

Fatema Albalooshi and **Vijayan K. Asari**, "Optimization of object region and boundary extraction by energy minimization of a recurrent neural network for activity recognition," ***SPIE Conference on Defense, Security, and Sensing:*** *Independent Component Analyses, Compressive Sampling, Wavelets, Neural Net, Biosystems, and Nanoengineering XI (Neural Network Learning Application)*, Baltimore, MD, USA, 29 April - 03 May 2013.

Saibabu Arigela and **Vijayan K. Asari**, "Locally tuned inverse sine nonlinear technique for color image enhancement," ***IS&T/SPIE International Conference on Electronic Imaging: Image Processing: Algorithms and Systems XI***, San Francisco, CA, USA, 3 - 7 February 2013.

Alex Mathew and **Vijayan K. Asari**, "Tracking small targets in wide area motion imagery data," ***IS&T/SPIE International Conference on Electronic Imaging: Video Surveillance and Transportation Imaging Applications***, San Francisco, CA, USA, 3 - 7 February 2013.

Ann Theja Alex, **Vijayan K. Asari**, and Alex Mathew, "Gradient feature matching for in-plane rotation invariant face sketch recognition," ***IS&T/SPIE International Conference on Electronic Imaging: Image Processing: Machine Vision Applications VI***, San Francisco, CA, USA, 3 - 7 February 2013.

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Vision - WACV 2013, Clearwater Beach, FL, USA, 17 - 18 January 2013.

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Alex Mathew and **Vijayan K. Asari**, "Local region statistical distance measure for tracking in wide area motion imagery," ***Proceedings of IEEE International Conference on Systems, Man and Cybernetics - (SMC 2012)***, Seoul, Korea, pp. 248-253, 14-17 October 2012.

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Yakov Diskin, Binu Nair, and **Vijayan K. Asari**, "Autonomous navigation using a 3D reconstruction model from monocular vision," ***The 25th International Technical Meeting of the Satellite Division of the Institute of Navigation - ION GNSS 2012:*** *Robust Navigation in GNSS-Challenged Environments*, Nashville, TN, 17-21 September 2012.

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Yakov Diskin and **Vijayan K. Asari**, "Dense point-cloud creation using superresolution for a monocular 3D reconstruction system," ***Proceedings of the SPIE Conference on Defense, Security, and Sensing: Visual Information Processing XXI***, Baltimore, MD, USA, 23-27 April 2012.

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Ming-Jung Seow, Ann Theja Alex, and **Vijayan K. Asari**, "A self-organized learning strategy for object recognition by an embedded line of attraction," ***Proceedings of the SPIE Conference on Defense, Security, and Sensing: Optical Pattern Recognition XXIII***, Baltimore, MD, USA, vol. 8398, pp. 839803: 1-13, 23-27 April 2012. (Invited Paper)

Mohammed N. Islam, **Vijayan K. Asari**, Mohammad A. Karim, and Mohammad S. Alam, "Target tracking using nonlinear reference phase-encoded joint transform correlation," ***Proceedings of the SPIE Conference on Defense, Security, and Sensing: Optical Pattern Recognition XXIII***, Baltimore, MD, USA, vol. 8398, pp. 83980B: 1-9, 23-27 April 2012.

Saibabu Arigela and **Vijayan K. Asari**, "Visibility improvement of aerial imagery by a locally tuned nonlinear enhancement technique," ***Proceedings of the 2012 IEEE Southwest Symposium on Image Analysis and Interpretation - SSIAI 2012***, Santa Fe, New Mexico, USA, pp. 217-220, 22-24 April 2012.

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J. Skeans, **E. J. Balster**, and K. L. Hill. "Analysis of Motion Estimation using Multiple Reference Frames in MPEG-4 AVC/JVT/H.264", in Proc. IEEE National Aerospace and Electronics Conference. Dayton, OH, July 25-27, 2012.

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J. M. McNichols, **E. J. Balster**, W. F. Turri, and K. L. Hill. "Implementation and Analysis of JPEG2000 System on a Chip", in Proc. International Symposium on Visual Computing (ISVC). Rethymnon, Crete, Greece, July 16-18, 2012.

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A. Jennings, **R. Ordonez**, "Unbounded Motion Optimization by Developmental Learning," IEEE Trans. on Cybernetics, Nov. 2012.

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H. Al Issa, **R. Ordonez**, "Robust multiplatform RF emitter localization," SPIE Defense, Security, and Sensing, Baltimore, Maryland, 23-27 April 2012.

M. Gates, R. Selmic, C. Barber, **R. Ordonez**, "Cooperative Control of MAVs for a Hidden Emitter Localization," SPIE Defense, Security, and Sensing, Baltimore, Maryland, 23-27 April 2012.

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E. Shin, P.T. Murray, **G. Subramanyam**, H. Malik, and K. Schwartz, "Synthesis of Oxidation resistant lead nanoparticle films by modified pulsed laser ablation", International Symposium on high power laser ablation, AIP Proceedings 1464, pp. 190-199, 2012.

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